CLAIMS

What is claimed is:

1. A fixed wavelength, external cavity semiconductor laser, comprising:
a semiconductor gain medium;
an intracavity filter having a filter function specifying a frequency of operation of the laser; and
modulation system that modulates an optical length of the cavity to change spectral locations of longitudinal modes of the cavity relative to the filter function.

2. A laser as claimed in claim 1, wherein the intracavity filter is angled relative to an axis of the cavity to avoid coupling of light reflected by the intracavity filter into the semiconductor gain medium.

3. A laser as claimed in claim 1, further comprising two polarization rotators, on either side of the intracavity filter, that rotate a polarization of light in the cavity with the light at the filter function having a polarization for amplification in the semiconductor gain medium and light outside the filter function being at an orthogonal polarization.

4. A laser as claimed in claim 3, wherein the polarization rotators comprise quarterwave plates.

5. A laser as claimed in claim 3, wherein the polarization rotators comprise subwavelength period gratings.

6. A laser as claimed in claim 1, wherein the semiconductor gain medium is a semiconductor optical amplifier.

7. A laser as claimed in claim 1, wherein the semiconductor gain medium has an antireflection coated front facet and a backfacet coated to be reflective.

8. A laser as claimed in claim 1, further comprising a backfacet monitor diode oriented to detect light emitted from a backfacet of the semiconductor gain medium.

9. A laser as claimed in claim 1, further comprising a front monitor diode oriented to detect light output from the cavity.

10. A laser as claimed in claim 1, further comprising:
a partial reflector inserted in an output beam from the cavity; and
a front monitor diode oriented to detect light reflected by partial reflector.

11. A laser as claimed in claim 1, wherein the modulation system, semiconductor gain medium, and intracavity filter are located within a hermetic cover.

12. A laser as claimed in claim 11, further comprising a window structure in the cover, through which an output beam from the cavity is transmitted.

13. A laser as claimed in claim 12, further comprising a front monitor diode, the window structure being angled relative to an axis of the output beam to reflect light from the output beam to the front monitor diode.

14. A laser as claimed in claim 12, further comprising an isolator, installed on the bench external to the cover, receiving the output beam after transmission through the window structure.

15. A laser as claimed in claim 12, further comprising a focusing lens and an optical fiber pigtail that are installed on the bench external to the cover, the focusing lens coupling the output beam, after transmission through the window structure, into the fiber pigtail.

16. A laser as claimed in claim 1, wherein the temperature of the system is uncontrolled.

17. A laser as claimed in claim 1, wherein temperature of the system is allowed to fluctuate with ambient temperature.

18. A laser as claimed in claim 1, wherein the modulation system comprises a deflectable MEMS structure.

19. A laser as claimed in claim 1, wherein the modulation system comprises a deflectable membrane structure.

20. A laser as claimed in claim 1, wherein the modulation system comprises a semiconductor substrate.

21. An intracavity composite filtering structure, comprising:

spectral filter material;

a polarization rotator attached to one side of the filter material; and

a collimating lens attached to the filter material for coupling a beam into and/or out of the filter material.

22. A structure as claimed in claim 21, wherein the polarization rotator comprises a quarterwave plate.

23. A structure as claimed in claim 21, wherein the polarization rotator comprises a subwavelength period grating.

24. A structure as claimed in claim 21, further comprising another polarization rotator attached to an opposite side of the filter material relative to the other polarization rotator.